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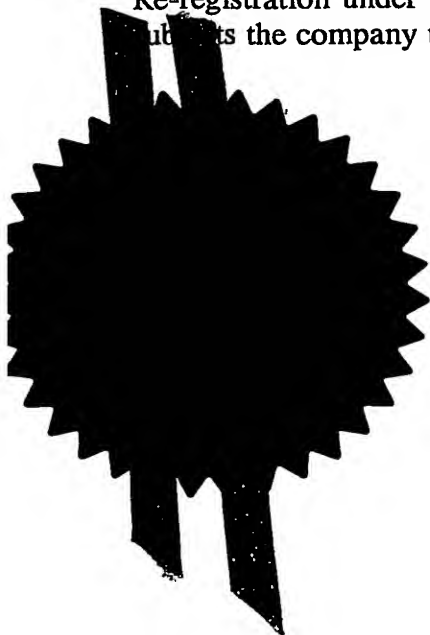
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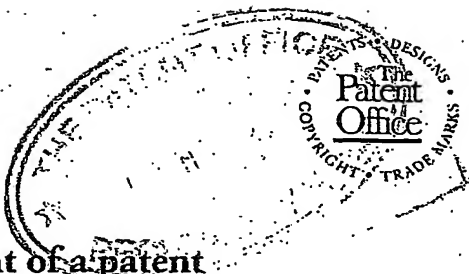
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05NOV03 E849424-2 D02890  
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**Request for grant of a patent**

(See the notes on the back of this form. You can also get an explanatory leaflet from the Patent Office to help you fill in this form)

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Cardiff Road  
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NP10 8QQ

1. Your reference

RSJ08022GB

2. Patent application number

(The Patent Office will fill this part in)

04 NOV 2003

0325729.2

3. Full name, address and postcode of the or of each applicant (underline all surnames)

07563612001

Patents ADP number (if you know it)

De La Rue International Limited  
De La Rue House, Jays Close  
Viables, Basingstoke  
Hampshire, RG22 4BS  
GREAT BRITAIN

If the applicant is a corporate body, give the country/state of its incorporation

Great Britain

4. Title of the invention

SECURITY DEVICE

5. Name of your agent (if you have one)

Gill Jennings & Every

"Address for service" in the United Kingdom to which all correspondence should be sent (including the postcode)

Broadgate House  
7 Eldon Street  
London  
EC2M 7LH

Patents ADP number (if you know it)

745002

6. Priority: Complete this section if you are declaring priority from one or more earlier patent applications, filed in the last 12 months.

Country

Priority application number  
(if you know it)

Date of filing  
(day / month / year)

7. Divisionals, etc: Complete this section only if this application is a divisional application or resulted from an entitlement dispute (see note f)

Number of earlier UK application

Date of filing  
(day / month / year)

8. Is a Patents Form 7/77 (Statement of inventorship and of right to grant of a patent) required in support of this request?

YES

Answer YES if:

- a) any applicant named in part 3 is not an inventor, or
- b) there is an inventor who is not named as an applicant, or
- c) any named applicant is a corporate body.

Otherwise answer NO (See note d)

Patents Form 1/77

# Patents Form 1/77

9. Accompanying documents: A patent application must include a description of the invention. Not counting duplicates, please enter the number of pages of each item accompanying this form:

Continuation sheets of this form

Description 11

Claim(s) 4

Abstract

Drawing(s) 1 + 1 *He*

10. If you are also filing any of the following, state how many against each item.

Priority documents

Translations of priority documents

Statement of inventorship and right to grant of a patent (Patents Form 7/77)

Request for a preliminary examination and search (Patents Form 9/77)

Request for a substantive examination (Patents Form 10/77)

NO

Any other documents (please specify)

11. I/We request the grant of a patent on the basis of this application.

For the applicant

Gill Jennings & Every

Signature *Robert James*

Date 04/11/03

12. Name, daytime telephone number and e-mail address, if any, of person to contact in the United Kingdom

SKONE JAMES, Robert Edmund

020 7377 1377

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## Notes

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SECURITY DEVICE

The invention relates to security devices for securing articles and documents of value such as banknotes, cheques, identity documents such as passports, and documents used for brand protection etc.

A wide variety of security devices have been used in the past, some applied directly to articles or documents and others provided in the form of labels which are then transferred onto the articles. These security devices are typically in printed and/or embossed form and define many different security designs. Other security features are embedded into documents during their manufacture such as watermarks and electrotypes.

US-A-6505779 describes the provision of security indicia formed by at least partly transparent windows formed through a security document and which are detectable in transmitted light. Indicia are provided within the bounds of a security pattern acting to visually conceal the security indicia in reflected light. This invention is based on the principle that it is possible to hide or conceal small amounts of information within larger and visually confusing information structures. A disadvantage of this technique is that it utilizes a relatively large area of the document and also does not completely hide the security indicia.

There is a continuing need to provide new security features which are more difficult for counterfeiters and fraudsters to reproduce.

In accordance with a first aspect of the present invention, a security device comprises an area of one or more solid colours defining a negative image on a, preferably at least translucent, substrate, the negative image being filled with a discontinuous pattern; and a camouflage pattern printed over the negative image and at least an adjacent region of the solid colour area, the camouflage pattern having a colour and pattern such that it

cooperates with the discontinuous pattern and the solid colour area to render the negative image substantially invisible under reflected light but visible under transmitted light.

5 We have found surprisingly that the discontinuous pattern, which otherwise would be very obvious in reflection, can be hidden when overprinted with a suitable camouflage pattern and at the same time the two patterns hide the negative image. In particular, the eye is  
10 confused if a camouflage pattern with a similar line width and colour to the background areas between elements of the discontinuous pattern is provided over the underlying discontinuous pattern. However, we have also identified a design where the line width of the camouflage pattern is  
15 much greater than the background areas, but the unprinted areas in the disguise (ie it is a white line type of design) are of a similar width to the discontinuous elements.

The invention also works because in transmission, the  
20 camouflage pattern is no longer clearly visualised over the solid area, due to the high opacity of this area and therefore ceases to act as a disguise for the discontinuous pattern. If the size of the elements of the discontinuous pattern is sufficiently small, the shape of the negative  
25 image is visualised instead of the individual background areas.

The discontinuous pattern enables light to be transmitted through the negative image when viewed in transmission but enables the visibility of the negative  
30 image to be reduced in reflected light.

Some advantages over the prior art are that the invention can be practised as a white pattern which can

substrate. It enables a transmission print feature to be produced on documents printed using multi-unit presses. The feature adds to the security of documents containing other transmission features because it encourages the public to view documents in transmission, thus ensuring other transmission features e.g. watermarks, electrotypes, embedded threads, windowed threads, see-through features etc. within the document are also checked. In a preferred embodiment, the design of the security device is complemented by features such as electrotypes and see-through features etc. e.g. an apple is revealed in transmission within both the feature and the electrotype. The feature is more difficult to counterfeit compared to the prior art as it cannot be reproduced by colour copying or DTP and cannot readily be resolved into its components to allow counterfeiting by printing techniques.

The camouflage pattern is preferably selected so that one dimension of the design, e.g. the thickness of a line making up a line pattern, is approximately the same as the width of background areas defined between elements of the discontinuous pattern. Preferably, the colour of the camouflage pattern is chosen to match that of the background visible through the discontinuous pattern, e.g. white or a pale tint. Preferably the discontinuous pattern is approximately the same colour as the, or a major, colour of the solid area, although some of the elements making up the discontinuous pattern can be different colours. This is more important for lighter colours than for darker colours.

If the discontinuous pattern is printed in a pale tint over a white background, the discontinuous pattern is more readily disguised, but the negative image is hard to see in transmission as there is insufficient contrast with the solid areas.

The camouflage pattern can either be an all over type of design, or a medallion type. The camouflage pattern can either be regular or irregular and may consist of one or

more of lines, dots, squares, or other small shapes. Preferred designs are those which contain distinctive images or patterns. For example preferred designs are those which show macroscopic regularity but have smaller scale elements at different angles.

The camouflage pattern may be printed using one of litho, gravure, screen, flexo, ink jet, laser, toner transfer, or digital printing, or dye diffusion. In the preferred embodiment, a white intaglio ink is used.

Preferred camouflage patterns have elements with a width in the range of 0.1-1.5mm and a separation of 0.1-4mm, preferably a width of 0.25-1.25mm and a separation of 0.25-3mm. It has been found surprisingly that even when the camouflage pattern is provided at a high ink coverage, the negative image can still be observed in transmission. It is also of benefit if the camouflage pattern contains distinctive images or patterns itself. This is because of perceptual organisation when the eye views an image, whereby the brain tends to process images on the basis of grouping and therefore does not clearly perceive the discontinuous patterns defining the negative image below.

The discontinuous pattern typically comprises an array of dots, lines, squares or other small shapes such as alphanumerics, graphical shapes and the like or a combination thereof and will generally provide 50-80%, preferably 60-70%, coverage of the negative image area. The maximum lateral dimension of the individual elements defining the discontinuous pattern is dependent on the design but will typically be less than 1.5mm, preferably less than 1mm.

The discontinuous pattern can have either a stochastic or regular placement.

being substantially the same as the or a major one of the solid colours.

The discontinuous pattern can be applied by any conventional printing method such as one of intaglio, litho, gravure, screen, flexo, ink jet, laser, toner transfer, or digital printing, or dye diffusion or it can be applied as a partially demetallized foil, a holographic patch printed film, a set of transferred elements etc.

Typically, elements making up the camouflage pattern and background areas between the elements are approximately the same size. For example, for a black line type of design at least one dimension of the line printed should be approximately the same width as that of the background areas between elements of the discontinuous pattern.

However, for a white line type of design, at least one dimension of the unprinted area between the printed lines should be approximately the same width as the elements of the discontinuous pattern.

The negative image itself can define simple shapes such as circles or squares or more complex shapes such as stars, alphanumeric indicia, or other images such as a butterfly, apple or bird. The negative image has typical dimensions in the range 10-15mm x 10-15mm but could be from 2.5mm to 30mm in its maximum lateral dimension.

Conveniently, the discontinuous pattern is provided on a background which may be unprinted; previously printed with another flat tint or discontinuous pattern which can either be out of register or in register with the discontinuous pattern filling the negative image; or subsequently printed with another flat tint or discontinuous pattern which can either be out of register or in register with the discontinuous pattern filling the negative image. In the preferred approach, the background is unprinted.

The background colour is preferably white or a pale colour and, if printed, this could be achieved by printing at a low density so that there is a difference in contrast



between the solid colour area and the background elements with the discontinuous pattern so as to enable the negative image to be seen clearly in transmission.

5 A corresponding area of solid colour defining a similar negative image filled with a similar discontinuous pattern could be provided on the opposite side to the one device. This second device could be printed so that the discontinuous pattern is in perfect register with that of the one device, alternatively an inverse of the  
10 discontinuous pattern could be printed again in perfect register. This printing in perfect register could be viewed from the second side as a conventional see-through feature and conveniently enables a check to be made that the security document was printed on a common impression  
15 press. The second image may or may not be camouflaged. In this case, it would be possible for the two "images" to define respective image elements of a common, single image.

Generally, any print on the second side which is out of register with the discontinuous pattern, should be of  
20 low print density in the region of the device.

The solid colour area can be applied by any conventional printing method such as one of intaglio, litho, gravure, screen, flexo, ink jet, laser, toner transfer, or digital printing, or dye diffusion and is  
25 preferably (but not necessarily) printed simultaneously with the discontinuous pattern. Alternatively, if a foil or holographic patch is used for the discontinuous pattern, the solid colour area may comprise a non-demetalised film.

The solid colour area and the discontinuous pattern  
30 can either be a single colour, two or more colours, or rainbowed colours. In the case of printed patterns the

contrast with the background colour. Furthermore, it is preferred that there is a relatively high contrast between the solid colour and discontinuous pattern. Measurements of examples have shown that the difference in lightness  $\Delta L^*$  between the solid colour and the discontinuous pattern should be 10-30 and more preferably 15-25. It is interesting to note, however, that in the preferred examples there is only a minor difference in opacity between the solid colour and the discontinuous pattern.

10 The negative image defined by the area of solid colour is visualised in transmission due to the significant difference in opacity between the solid colour and the background elements within the discontinuous pattern and the contrast in colour between the solid area and

15 background elements.

In the preferred embodiment, the actual colour of the solid colour and the elements of the discontinuous pattern are the same colour. It is the colour of the discontinuous pattern and background as perceived at a distance ie on a macroscopic scale, which has the contrast.

20

The solid colour can either be used to provide a distinct security device such as a medallion type or the like or can be incorporated into a larger design. The larger design could include other security features commonly found on security documents such as anti-copy structures, see-through features, microtext, etc.

25

In accordance with a second aspect of the present invention, a security device comprises an area of one or more solid colours defining a negative image on a, preferably at least translucent, substrate, the negative image being filled with a discontinuous pattern, wherein the solid colour and the discontinuous pattern are formed from one or more reflective media, wherein the form of the discontinuous pattern and the solid area are chosen such

30

35 that the negative image is not visible under reflected light but is visible under transmitted light.

We have found surprisingly that it is possible to design a discontinuous pattern in this case, typically with a coverage of more than 70%, in which the negative image is hidden in reflection but visible in transmission. This has an additional advantage over devices according to the first aspect of the invention in that it gives an added level of security with respect to colour copying and DTP counterfeiting. This approach works because when a discontinuous reflective pattern is viewed in reflection, providing the discontinuous elements are sufficiently small, the eye cannot discern the background areas within the pattern and between the discontinuous elements. There is sufficient contrast between the surrounding solid area and the discontinuous pattern such that the shape of the negative image can be seen in transmission.

The solid area is typically printed, most commonly at the same time as the discontinuous pattern, using a reflective medium such as a metallic ink. However, other media such as a metallic foil or holographic applied feature could be used or even a highly reflective (eg high gloss and colour saturated) colour such as an iridescent material or OVI.

Preferably, the elements defining the discontinuous pattern each have at least one lateral dimension exceeding 0.5mm.

In other respects, the preferred features of this device are similar to those for devices according to the first aspect of the invention.

In one modified form of the second aspect of the invention, the solid area and discontinuous pattern is embossed with an image. This provides a further security feature such as a latent image. The embossed area can be used to provide a further security feature.

In another approach, a device according to the second aspect of the invention may be overprinted with an image in a contrasting colour. This image or design may be printed typically by intaglio but also by litho, gravure, screen, flexo, etc. The design may be of the camouflage pattern type described above or any other design providing the line density is such that the negative image can be viewed in transmission.

The security device may be provided in an area of a substrate with reduced opacity as compared with other parts of the substrate although this is not essential. In the case of a paper substrate, this reduction in opacity can be achieved by a variety of techniques such as those described in EP-A-0388090, GB-A-2282611 and GB-A-2283026 for producing an area of greater transparency during manufacture of the substrate or it could be formed during a post processing operation. This has the advantage that the device can be viewed easily in transmission without specialized viewing equipment.

Instead of a paper substrate, a polymer substrate could also be used.

The security device could be printed onto a substrate such as paper previously coated with a protective coating such as Platinum® or which is subsequently coated with a protective varnish.

Some examples of security devices according to the invention will now be described with reference to the accompanying drawings, in which:-

Figure 1 is a schematic, plan of a security document provided with a security device;

Figures 2A, 2B and 2C illustrate a negative image, a camouflage pattern, and the two combined, respectively, of a first example of a security device; and,

Figures 3A-3C are similar to Figures 2A-2C but of a second example.

Figure 1 represents a plan view of a security document such as a banknote. Generally, printed information

typical of such secure documents e.g. denomination, currency, portraits, anti-copy line structures etc. are located in area 2. The example of a security device according to the present invention 3 is located within area 2.

Example 1 (Figures 2A-2C)

The elements of this security device were litho printed onto white paper of approximately 90gsm. In this first example, a solid print area 5 printed in a deep blue colour with CIE  $L^*a^*b^*$  colour coordinates  $L^*=53.34$ ,  $a^*=-11.74$ ,  $b^*=-23.90$  defines a negative image 5A in the form of a star. The star 5A is filled with a discontinuous pattern 4 printed in approximately the same colour as the solid area, which when measured on a spectrophotometer together with the associated unprinted background elements has colour coordinates  $L^*=71.49$ ,  $a^*=-4.7$ ,  $b^*=-10.84$ . The discontinuous pattern 4 is defined by an array of squares which are 0.387mm x 0.387mm and are surrounded by an unprinted border which is 0.113mm which gives an ink coverage of approximately 60%. The screen angle is 45°. The camouflage pattern illustrated in Figure 2B was intaglio printed over image 2A in white. This camouflage pattern was designed so that when overprinted over image 2A, the eye is not able to resolve the shape of the negative image 5A. The ink coverage of the camouflage pattern is approximately 70%. Figure 2C illustrates the resultant image when viewed in reflection and the image 5A is not visible. When viewed in transmission, the star shaped outline 5A filled with discontinuous pattern 4 is clearly seen.

L\*=49.59, a\*=8.66, b\*=-26.69 defining two negative images 6,7 forming the number "10". Each negative image 6,7 is filled with a discontinuous pattern printed in approximately the same colour as the solid area, which when measured on a spectrophotometer together with the associated unprinted background elements has colour coordinates L\*=72.31, a\*=4.3, b\*=-11.58. The discontinuous pattern comprises a regular array of dots which are 0.54mm in diameter with a 0.57mm spacing between centres which gives an ink coverage of approximately 70%. The screen angle is 45°. The camouflage pattern illustrated in Figure 3B was intaglio printed over the image of Figure 3A in white. This camouflage pattern, which consists of a number of replicated design elements was designed so that when overprinted over image 3A, the eye is not able to resolve the shape of the outline filled with discontinuous images. The ink coverage is approximately 70%. Figure 3C illustrates the resultant image when viewed in reflection and the images 5,7 are not visible. When viewed in transmission, the numeral 10 outlines filled with discontinuous patterns are clearly seen.

CLAIMS

1. A security device comprising an area of one or more solid colours defining a negative image on a, preferably at least translucent, substrate, the negative image being filled with a discontinuous pattern; and a camouflage pattern printed over the negative image and at least an adjacent region of the solid colour area, the camouflage pattern having a colour and pattern such that it cooperates with the discontinuous pattern and the solid colour area to render the negative image substantially invisible under reflected light but visible under transmitted light.
2. A device according to claim 1, wherein the discontinuous pattern comprises an array of dots which is either regular or stochastic.
3. A device according to claim 2, wherein the discontinuous pattern comprises a half-tone dot array.
4. A device according to any of the preceding claims, wherein the discontinuous pattern comprises a regular array of similarly sized and shaped dots.
5. A device according to any of the preceding claims, wherein the discontinuous pattern comprises an array of dots in the form of circles, squares, lines, indicia such as alphanumerics, graphical shapes and the like.
6. A device according to any of claims 2 to 5, wherein each dot has a maximum lateral dimension of less than 1.5mm, preferably less than 1mm.
7. A device according to any of the preceding claims, wherein the discontinuous pattern is substantially the same colour as the or a major one of the solid colours.

8. A device according to any of claims 1 to 7, wherein the discontinuous pattern has the same colour as the or a major one of the solid colours.

cover an area of 50-80%, preferably 60-70%, of the negative image.

10. A device according to any of the preceding claims, wherein the camouflage pattern comprises a line pattern.

5 11. A device according to any of the preceding claims, wherein elements making up the camouflage pattern and background areas between the elements are approximately the same size.

10 12. A device according to any of the preceding claims, wherein the camouflage pattern has a colour which contrasts with that of the discontinuous pattern.

13. A device according to any of the preceding claims, wherein the camouflage pattern defines elements having a width in the range 0.1-1.5mm and a separation of 0.1-4mm, preferably having a width of 0.25-1.25mm and a separation of 0.25-3mm.

14. A device according to any of the preceding claims, wherein the camouflage pattern has an ink coverage of 50-90%, preferably 55-75%.

20 15. A device according to any of the preceding claims, wherein the camouflage pattern has a colour which is the same or similar to that of the background areas between elements of the discontinuous pattern.

25 16. A device according to any of claims 1 to 14, wherein the camouflage pattern has a colour which is the same or similar to that of one or both of the solid colour(s) and discontinuous pattern.

30 17. A device according to any of claims 1 to 14, wherein the camouflage pattern has a colour which contrasts with the solid colour(s) and discontinuous pattern.

35 18. A device according to any of the preceding claims, wherein the camouflage pattern and/or discontinuous pattern has been printed using one of intaglio, litho, gravure, screen, flexo, ink jet, laser, toner transfer, or digital printing, or dye diffusion.



19. A device according to any of the preceding claims, wherein the camouflage pattern comprises a black or white line design.

5 20. A device according to any of the preceding claims, wherein the solid colour area contrasts in colour with the apparent colour of the discontinuous pattern and associated background areas so as to enable the negative image to be clearly seen in transmission.

10 21. A device according to any of the preceding claims, wherein the solid colour area forms part of a larger design printed on the substrate on which the security device is provided.

15 22. A device according to any of the preceding claims, wherein the area of solid colour was printed using one of litho, gravure, screen, flexo, ink jet, laser, toner transfer, or digital printing, or dye diffusion.

23. A device according to any of claims 1 to 21, wherein the area of solid colour was provided as a foil or holographic patch.

20 24. A device according to any of the preceding claims, wherein the discontinuous pattern was formed by a partially demetallised metal layer.

25 25. A device according to any of claims 1 to 23, wherein the discontinuous pattern was formed by transfer of elements from a carrier.

26. A device according to any of claims 1 to 22, wherein the solid area of colour was printed simultaneously with the discontinuous pattern.

30 ~~27. A device according to any of the preceding claims,~~  
wherein the device is provided on a background with a flat tint such as white.

~~28. A device according to any of the preceding claims,~~

~~wherein the device is provided on a background with a flat tint such as white.~~

~~29. A device according to any of the preceding claims,~~

~~wherein the device is provided on a background with a flat tint such as white.~~

~~30. A device according to any of the preceding claims,~~

~~wherein the device is provided on a background with a flat tint such as white.~~

30. A security device comprising an area of one or more solid colours defining a negative image on a, preferably at least translucent, substrate, the negative image being filled with a discontinuous pattern, wherein the solid colour and the discontinuous pattern are formed from one or more reflective media, wherein the form of the discontinuous pattern and the solid area are chosen such that the negative image is not visible under reflected light but is visible under transmitted light.
31. A device according to claim 30, wherein the solid colour area and discontinuous pattern are embossed or overprinted with an image.
32. A device according to claim 30 or claim 31, wherein the discontinuous pattern is a printed metallic ink.
33. A device according to claim 30 or claim 31, wherein the discontinuous pattern is a printed OVI or other colour shifting ink.
34. A device according to any of claims 30 to 32, wherein the solid colour area is a printed metallic ink.
35. A security device according to any of claims 30 to 34 and any of claims 1 to 29.
36. A security device according to any of the preceding claims, provided on an article or document of value.
37. A security device according to any of the preceding claims provided on an area of a document which is more transparent than other areas of the document.

Figure 1

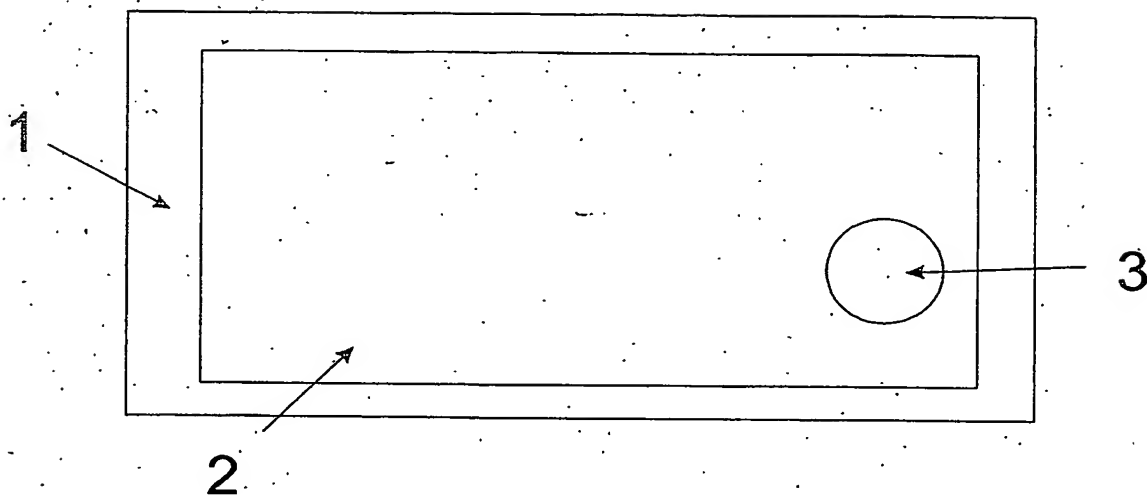


Figure 2

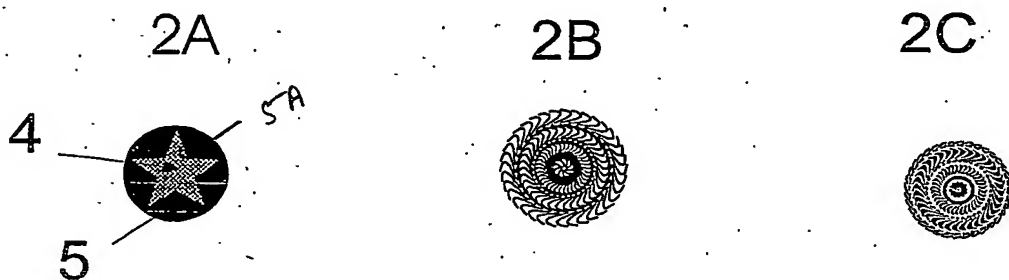
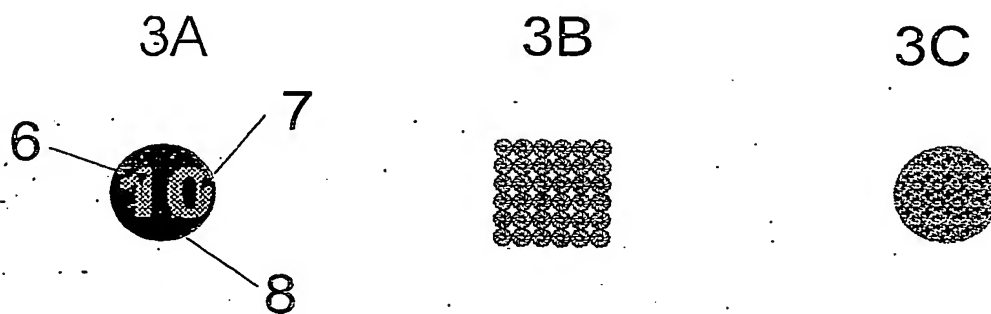


Figure 3



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